THE ELIMINATION OF FALSE DIGIT DISPLAY IN SEGMENTED-TYPE READOUTS

Segmented-type digital readouts have many obvious advantages over other types of readouts. First, the illuminating devices, being very close to the surface of the display, produce digits which are all in the same plane and free from annoying obstructions. This also allows the segmented type display to be comfortably viewed from wide angles without the image washout which occurs in readouts which project a digit onto a front diffuser and are best viewed head-on. Another advantage is the high brightness obtainable with segmented readouts due to the direct illumination of each segment without the light losses of complicated optical systems. However, a major disadvantage of segmented readouts is the occurrence of false digit display.

Fig. 1 The ten digits as they normally appear on the NSDFS segmented-type readout.

Fig. 2 Digits at the left have normal appearance. Lamp failures cause false digits to appear in conventional segmented readouts, as shown in center. With the fail-safe readout discussed here, any segment lamp failure causes the bottom and right leg segments to drop out, thus, as shown at the right, the failures produce unintelligible characters.

This disadvantage has been overcome in a new segmented-type digital readout developed by M.B. Associates of Philadelphia. As explained by H. L. Martins, Director of Engineering at M.B., lamp failures cannot cause false digits to be displayed on this readout.

Designated Type NSDFS, the readout consists of seven segments, each illuminated by a lamp. Fig. 1 shows the ten digits as they normally appear on the readout. One or more lamp failures in any digit except the 1, 2, or 5 could cause a false digit to be displayed on a conventional segmented display. However, in the NSDFS readout, a lamp failure in **any** segment causes the lamps in the lower right and bottom segments to remain out. An examination of the ten digits will show that without these two segments illuminated a normal digit cannot be displayed. This is illustrated in Fig. 2. At the left of Fig. 2 are shown two digits, 6 and 8, as they normally appear. In the center are the digits as they would appear on a conventional segmented readout in the event of certain lamp failures. A failure of the lower left segment when a 6 is to be displayed results in a 5 instead. Failures of the upper left and lower left segments when an 8 is to be displayed result in a 3. At the right of Fig. 2 are the digits as they would appear on the NSDFS readout in the event of the same lamp failures. It is impossible for the segments remaining lit to be interpreted as a normal digit.

The NSDFS readout, shown in Fig. 3, is the latest addition to M.B. Associates' line of NSD digital readouts. All of the readouts in this line use high brightness neon lamps for illumination. These lamps are operated to give 60,000 hours life so that for most applications the fail-safe feature is not required. However, in certain critical applications, the additional reliability afforded by the NSDFS display is desirable.

The failure mode of high brightness neon lamps is such that at the end of life their firing voltage rises and exceeds the circuit voltage available to operate them. They then appear to the driving source as an open circuit. This fact is used in sensing and correcting for a lamp failure.

Martins looks for a wider acceptance of segmented-type readouts as the result of eliminating false digit presentation.

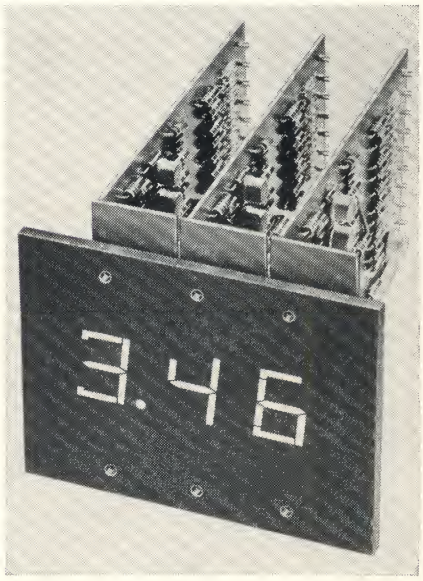

Fig. 3 M.B. Associates' NSDFS readout assembly. Decoder-driver and circuitry which provides fail-safe indication are integrally mounted with readout. Cost is $49 per digit.

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